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(54) PRODUIT PERMETTENT DE LUTTER CONTRE ET DE DESACTIVER LES AGENTS PATHOGENES DE PLANTES

(54) AGENT FOR REPELLING AND INACTIVATING PATHOGENIC ORGANISMS OF PLANTS

(57)

The invention relates to a disinfecting agent for combating and inactivating phytopathogenic organisms, for use on the plant and in its environment. The agent is based on a mixture of anionic active tensides, aliphatic and aromatic carboxylic acids, glycols, hydrotropic agents and aliphatic monovalent alcohols and is characterised in that in addition to the hydrotropic agents and monovalent alcohols, it contains a solvent in the form of a combination of alkyl- and/or alkylarylsulfonates, certain aliphatic and aromatic carboxylic acids and certain individual or mixed glycols.

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(54) Title: AGENT FOR REPELLING AND INACTIVATING PATHOGENIC ORGANISMS OF PLANTS

(57) Abrégé/Abstract:
The invention relates to a disinfecting agent for combating and inactivating phytopathogenic organisms, for use on the plant and in its environment. The agent is based on a mixture of anionic active tensides, aliphatic and aromatic carboxylic acids, glycols, hydrotropic agents and aliphatic monovalent alcohols and is characterised in that in addition to the hydrotropic agents and monovalent alcohols, it contains a solvent in the form of a combination of alkyl- and/or alkylarylsulfonates, certain aliphatic and aromatic carboxylic acids and certain individual or mixed glycols.

ABSTRACT

The invention relates to a disinfecting agent for combating and inactivating phytopathogenic organisms, for use on the plant and in its environment. The agent is based on a mixture of anionic active tensides, aliphatic and aromatic carboxylic acids, glycols, hydrotropic agents and aliphatic monovalent alcohols and is characterised in that in addition to the hydrotropic agents and monovalent alcohols, it contains a solvent in the form of a combination of alkyl- and/or alkylarylsulfonates, certain aliphatic and aromatic carboxylic acids and certain individual or mixed glycols.

AGENTS FOR REPELLING AND INACTIVATING PATHOGENIC ORGANISMS OF PLANTS

Every year, truck farms, meristem operations and plant cultivators sustain great damage due to organisms [germs] that infect sets [plantlets], young plants, mother plans and seeds, destroying them or rendering them useless. If, for example, viruses enter a cultivation, it can be assumed that 100 % of the plants will be damaged. The only option open to the truck farms then is the radical measure of destroying the entire culture.

Specifically active agents are commercially available with which a few phytopathogens can be combated without influencing the vitality of the plant. These agents, designated as pesticides, are systemically effective but usually have only a narrow spectrum of activity.

On the other hand, a significantly broader spectrum of activity is offered by common disinfecting agents based on aldehydes, phenols, halogens, peroxides and quaternary ammonium compounds. If these "surface disinfecting agents" get on the plant or are directly applied to the plant, this always entails irreversible damage to the plant. This means that such disinfecting agents can only be used on working surfaces, positioning surfaces and devices such as, e.g., knives and the like. The surfaces must be freed thereafter from adhering remnants of active substances in order not to endanger the plants during subsequent working steps.

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DE OS 32 27 126 and DE OS 32 29 097 teach that certain combinations of anionic surfactants, aliphatic and aromatic carboxylic acids as well as a few heteroaromatic acids are capable of comprehensively killing off or inactivating viruses, bacteria and fungi without gaps in their activity.

The microbes tested according to the above-cited Offenlegungsschriften and patents were primarily human-pathogenic organisms with a low infectiousness like those recommended as test microbes by, among others, the German Society for Hygiene and Microbiology (DGHM) and the German Society for Veterinary Medicine (DVG).

The application of the teaching to highly infectious and resistant phytopathogenic organisms displayed a microbicidal and virus-inactivating activity that was just as persevering as had already been shown to be the case with the human-pathogenic test germs.

However, further tests for plant compatibility with the same agents regularly resulted in a damaging of the test plants in the form of severe scorching, so that the use on plants appeared to be excluded.

It was known from EP 0,091,213 that powdery pesticides against insects or nematodes can be produced that contain a liquid insecticide or nematocide and certain glycols such as ethylene, glycol, propylene glycol, triethylene glycol, glycerol or certain polyethylene glycols and similar

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compounds as well as an inert, solid carrier, [that] are used for dusting seeds and are not phytotoxic.

It was surprisingly found that the use of certain acid combinations and surfactant combinations in the presence of glycols overcomes the previous deficiency in the combating of phytopathogenic organisms and that when applied directly onto a plant they retain a pronounced bactericidal, fungicidal

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and viricidal activity and do not damage the plant cells (roots, stems, leaves, flowers and fruit) in the application concentration.

The present invention has as subject matter agents for treating plants and their environment with the goal of killing off phytopathogenic bacteria, fungi, viruses and viroids and to hinder their spread. Even pathogens that are already on plants can be killed off or inactivated (viruses) by these agents by moistening roots, stems, leaves and flowers without damaging the plant cells. The biological behavior of the plant is also not altered by the treatment. Working areas in the vicinity of the plants (e.g., tables, knives, positioning surfaces) that could cause a contamination are also freed in a persevering [lasting] manner of noxious organisms therewith without phytotoxic residues having to be subsequently removed.

Examples for formulating the agents according to the patent claim[s]

The following examples are intended to explain the patent claim[s] without limiting them.

Example 1)

Components	Parts by weight (%)
Alkylarylsulfonate potassium	8.50 % by wt.

Propane diol-1,2	20.50
Toluene sulfonate potassium	10.00
p-Hydroxybenzoic acid	6.90
Hydroxyethanoic acid	3.80
Propanol-2	28.00
Water (desalinated)	18.50

Example 2)

Alkylsulfonate potassium	10.00 % by wt.
Ethane diol-1,2	15.00
Cumene [cumol] sulfonate potassium	10.00
p-Hydroxybenzoic acid	6.90
Oxoethanoic acid	7.00
Propanol-1	15.00
Propanol-2	15.00
Water (desalinated)	18.50

Example 3)

Alkylarylsulfonate potassium	12.00 % by wt.
Ethane diol-1,2	18.00
Cumene [cumol] sulfonate potassium	8.00

Benzoic acid	7.00
2-Hydroxypropionic acid	7.00
Propanol-1	20.00
Propanol-2	15.00
Water (desalinated)	13.00

Example 4)

Components	Parts by weight (%)
Alkylsulfonate (C8-C18) potassium	7.00 % by wt.
Alkylsulfonate (C12) potassium	3.00
Ethane diol-1,2	12.00
Cumene [cumol] sulfonate potassium	11.50
Benzoic acid	9.00
2-Hydroxyethanoic acid	4.50
Propanol-1	15.00
Propanol-2	15.00
Water (desalinated)	23.00

Example 5)

Alkylarylsulfonate sodium	12.00 % by wt.
Cumene [cumol] sulfonate sodium	8.50

o-Hydroxybenzoic acid	9.50
2-Hydroxypropionic acid	5.00
Propanol-1	22.00
Propanol-2	20.00
Water (desalinated)	23.50

Bactericidal activity on the plant (biotest)

A. Young plant pelargoniums and begonias were contaminated by spraying with Xanthomonas campestris. A leaf surface of 1 cm^2 had 10^4 KBE after the contamination.

A treatment with example 4 in concentrations of 1.0 %, 2.0 % and 3.0 % took place, also with a spraying method, one hour after the inoculation.

Specimens were taken one hour after the treatment. The germs of the treated and of the untreated controls (without example 4) were removed from the leaves by ultrasound (wash liquid of 0 °C) and their number determined.

B. Pelargoniums and begonias were treated by spraying with example 4.

The contamination with Xanthomonas campestris took place, also with a spraying method, 24 hours after the treatment with example 4.

Specimens were taken one hour after the contamination. The germs of the treated and of the untreated controls (without example 4) were removed

from the leaves by ultrasound (wash liquid of 0 °C) and their number determined.

Scorching, lesions on the leaf edges and the leaf blades, germ reduction and leaf compatibility are cited in the following table:

		Pelargoniums		Begonias	
A	Concentration	Germ reduction	Toxic phenomena on leaves	Germ reduction	Toxic phenomena on leaves
	1.0% example 4	97%;93%	No lesions	<99%	No lesions
	2.0% example 4	100%;99.5 %	No lesions	99.9%	No lesions
	3.0% example 4	100%;99.9 %	A few leaf edge lesions	99.9%	Slight lesions on leaf edges
	1.0% example 5	98%;95%	Lesions on the leaf edges	99.5%; 99.7%	Lesions on the leaf edges and leaf blades
	2.0% example 5	100%;100 %	Lesions on the leaf edges and leaf blades	99.9%;99.9 %	Scorching on the leaf edges and the leaf blades
	3.0% example 5	100%;94%	Many lesions on the leaf edges and leaf blades	100%;100%	Scorching on the leaf edges and the leaf blades
B	1.0% example 4	98%	No lesions	95%	No lesions

Plant compatibility

Maximal tolerable concentrations of formulation examples 2, 4 and 5 on plant organs

[numerical and sign data require no translation]

Examples	**Plant organ**	**Phalaenopsis**[1] **Damage** **Lesions** **BR** **BS**
1.0 % example 2	Flowers	0
	Leaves	
	Flowers	
	Leaves	
	Flowers	

	Leaves	

Lesion. = Lesions

+++ = very many / very heavily damaged

++ = very / heavily damaged

\+ = few / slightly damaged

0 = none / not damaged

BR = leaf edges

BS = leaf blades

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[1] orchid type

The test for a sufficient inactivation of phytopathogenic organisms resulted in the following results:

1. Bactericidal action of examples 1 – 5 in a lab test according to "Guideline 16-4 for the Testing of Plant Protection Products for Disinfection in the Cultivation of Decorative Plants" of the Biological Federal Institute for Agriculture and Forestry (Braunschweig, 1986)

Required contact times of examples 1 – 5 for killing off the indicated bacterial strains

Examples	Xanthomonas pelargonii	Pseudomonas solanaceum	Erwinia amylovora
Tap water control	No activity	No activity	No activity
1.0% example 1	1 min.		
[see p. 8 for rest	of data]		

2. Fungicidal action of examples 1 – 5 in a lab test according to "Guideline 16-4 for the Testing of Plant Protection Products for Disinfection in the Cultivation of Decorative Plants" of the Biological Federal Institute for Agriculture and Forestry (Braunschweig, 1986)

Required contact times of examples 1 – 5 for killing off the indicated fungus test strains

Example	Fusarium oxysporum	Thielaviopsis basicola	Phythophtora sp	Cylindrocladium scoparium
Tap water control	No activity	No activity	No activity	No activity
1.0% example 1	16 h	> 16 h	1 h	> 16 h
[see p. 8 for rest	of data]			

Required contact times of examples 1 – 5 for inactivating the indicated viral strains (suspension test)

Disinfecting agent	TMV	PBY	PFBV	CNV	ORSV	PSTVd
Tap water control	No activity	No activity	No activity	No activity	No activity	No activity
1.0% example 1 2.0% example 1 3.0% example 1	16 h	16h	4 h	16 h	4 h	4 h
[see page 9 for	rest of	data]				

TMV = Tobacco mosaic virus

PVY = Potato virus Y Potyvirus

PFBV = Pelargonium flower break carmovirus

CNV = Cucumber necrosis tombuvirus

ORSV = Odontoglossum ringspot virus

PSTVd = Potato spindle tuber viroid

[page 10 duplicates the top half of page 8 of the original down to the bottom of the graph (page 11, bottom, and page 12, top, above)]

CLAIMS:

1. Disinfecting agents for combating and inactivating phytopathogenic organisms for use on plants and in the environment of plants, containing anionic surfactants, aliphatic and aromatic carboxylic acids in aqueous or aqueous-alcoholic solutions, characterized in that they contain mono-, di- and/or triglycols.

2. The disinfecting agents according to claim 1, characterized in that they contain aliphatic and aromatic carboxylic acids, preferably synergistically active microbicidal combinations of aliphatic and aromatic carboxylic acids, preferably methanoic acid, ethanoic acid, propanoic acid, hydroxyethanoic acid, 2-hydroxypropionic acid, oxoethanoic acid, 2-oxopropionic acid, 4-oxovaleric acid, benzoic acid, o-, m-, p-hydroxybenzoic acids, 3,4,5-tri-hydroxybenzoic acid, individually or mixed, in combination with alkyl sulfonates and/or alkylarylsulfonates and their sodium-, potassium- and ammonium salts, with primary chains with a length of C8 – C18 as anionic surfactants.

3. The disinfecting agents according to claim 1 or 2, characterized in that they contain ethylene glycol, propylene glycol, 2,3-butylene glycol, diethylene glycol [2,2'-dihydroxydiethylether], triethylene glycol [(1,2-di-2-hydroxyethoxyl-ethane] [sic] individually or in a mixture with each other,

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4. The disinfecting agents according to claims 1 to 3, characterized in that they contain hydrotropic agents, in particular toluene sulfonate and/or cumene sulfonate as sodium- or potassium salts and primary and/or secondary aliphatic, monovalent alcohols with a chain length of C2 – C8, preferably monovalent alcohols, individually or as a mixture.

5. The disinfecting agents according to claims 1 to 4, characterized in that the weight ratio of the aliphatic acids (A) to the aromatic acids (B) can be between 1 : 9 and 9 : 1 and their sum can be between 5 and 40 % by wt. relative to the total weight of the disinfecting-agent concentrate.

6. The disinfecting agents according to claims 1 to 5, characterized in that the weight ratio of the alkyl sulfonates and/or alkylarylsulfates and their salts (C) with the acids (A+B) in the ratio C : (B+A) can be = 1 : 9 and 9 : 1 and their sum can be between 10 and 60 % relative to the total weight of the disinfecting-agent concentrate.

7. The disinfecting agents according to claims 1 to 6, characterized in that the weight component of the glycols relative to the total weight of the disinfecting-agent concentrate can be between 10 and 40 % by wt.

8. The disinfecting agents according to claims 1 to 7, characterized in that the weight ratio of the hydrotropic agents toluene sulfonate and cumene sulfonate, their sodium- or potassium salts, individually or in a mixture with each other, can be between 5 and 40 % by wt. relative to the total weight of the disinfecting-agent concentrate.

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9. The disinfecting agents according to claims 1 to 8, characterized in that [some material was obviously omitted here – it is most likely the corresponding wording from claim 6 in the old set of claims above, namely, "the weight ratio of the monovalent alcohols, individually or in a mixture"] with each other, can be between 5 and 60 % by wt. relative to the total weight of the disinfecting-agent concentrate.

10. The use of the disinfecting agents according to claims 1 to 9 for combating phytopathogenic microorganisms on a vital plant or in its environment, characterized by a content of 0.5 to 10 % by wt. of the disinfection-agent concentrate in dilute aqueous solutions.

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